Male mental health problems, psychopathy and personality traits: Key findings from the first 14 years of the Pittsburgh Youth Study

Loeber, R.; Farrington, D.P.; Stouthamer-Loeber, M.; Moffitt, T.E.; Caspi, A.; Lynam, D.

published in
Clinical Child and Family Psychology Review
2002

DOI (link to publisher)
10.1023/A:1013574903810

document version
Publisher's PDF, also known as Version of record

Clinical Child and Family Psychology Review, Vol. 4, No. 4, December 2001 (© 2002)

Male Mental Health Problems, Psychopathy, and Personality Traits: Key Findings from the First 14 Years of the Pittsburgh Youth Study

Rolf Loeber,[1,5] David P. Farrington,[2] Magda Stouthamer-Loeber,[1] Terrie E. Moffitt,[3] Avshalom Caspi,[3] and Don Lynam[4]

This paper reviews key findings on juvenile mental health problems in boys, psychopathy, and personality traits, obtained in the first 14 years of studies using data from the Pittsburgh Youth Study. This is a study of 3 samples, each of about 500 boys initially randomly drawn from boys in the 1st, 4th, and 7th grades of public schools in Pittsburgh. The boys have been followed regularly, initially each half year, and later at yearly intervals. Currently, the oldest boys are about 25 years old, whereas the youngest boys are about 19. Findings are presented on the prevalence and interrelation of disruptive behaviors, ADHD, and depressed mood. Results concerning risk factors for these outcomes are reviewed. Psychological factors such as psychopathy, impulsivity, and personality are described. The paper closes with findings on service delivery of boys with mental health problems.

KEY WORDS: mental health; longitudinal studies; ADHD; conduct problems; impulsivity; depressed mood; personality; early psychopathy; service delivery.

Over the last decades the mental health of children has been a topic of national concern. Several reports (Miringoff & Miringoff, 1999; U.S. Congress, Office of Technology Assessment, 1986; U.S. Department of Health and Human Services, 1990) show a lack of basic knowledge about the developmental course of mental health problems as children grow into adults and about early risk factors. Mental health problems are defined here as either psychiatric diagnoses or extreme scores on mental health rating scales. We are particularly interested in multiple problem boys, who have mental health problems in several areas (such as conduct problems [CP], attention deficit-hyperactivity disorder [ADHD], and depressed mood). Also, we are particularly concerned about those boys whose problem behaviors start at a young age and who are at risk for chronic problems later (Loeber & Farrington, 2001).

Although there are many longitudinal studies on the development of boys' behavior problems, most have concentrated on delinquency, and relatively few have focused on child mental health problems as well (e.g., Elliott, Huizinga, & Menard, 1989; Fergusson, Horwood, & Lynskey, 1994). Other longitudinal studies have concentrated on mental health problems only (e.g., Angold & Costello, 1993; Cohen & Brook, 1987; Kellam, Ensminger, & Simon, 1980). There is an urgent need to study risk factors and the development of boys' mental health problems, both in the internalizing and externalizing domains. Examples of the former are depressed mood, shy/withdrawn behavior, and anxiety. Examples of the latter are oppositional defiant behavior, physical fighting, and early signs of psychopathy. Findings on delinquency, substance

[1]Department of Psychiatry, School of Medicine, University of Pittsburgh, Pittsburgh, Pennsylvania.
[2]Institute of Criminology, Cambridge University, Cambridge, England.
[3]Institute of Psychiatry, London, England.
[4]Department of Psychology, University of Kentucky, Lexington, Kentucky.
[5]Address all correspondence to Rolf Loeber, PhD, Western Psychiatric Institute and Clinic, 3811 O'Hara Street, Pittsburgh, Pennsylvania 15213; e-mail: loeberr@msx.upmc.edu.

1096-4037/022/1200-0273/0

use, sexual behavior, and early fatherhood are not included in this summary paper (but see Loeber et al., in press). In addition, studies on methodological issues are not included here (see Loeber, Farrington, Stouthamer-Loeber, & Van Kammen, 1998a). Very few studies have examined internalizing and externalizing problems in the context of early forms of psychopathy and personality traits (but see e.g., Jackson, Sher, & Wood, 2000; Krueger, Caspi, & Moffitt, 2000; Tremblay, Pihl, Vitaro, & Doblin, 1994).

There are several reasons why it is necessary to study a wide range of mental health problems in boys. First, such problems by themselves can be debilitating and cause later life maladjustment. Second, a considerable proportion of juveniles show mental health problems co-occurring with other problem behaviors. However, the extent and significance of such co-occurrence is still poorly understood (Caron & Rutter, 1991; Loeber & Keenan, 1994). Third, some child mental health problems, such as attention deficits and hyperactivity, may predict later serious maladjustment in other areas of functioning, such as delinquency (e.g., Farrington, Loeber, & Van Kammen, 1990). Fourth, information about risk factors of mental health problems is important in designing interventions.

The main aims of this paper are to present findings from the Pittsburgh Youth Study on (1) Mental health problems and disruptive behavior disorders, (2) Internalizing problems, (3) Multiple problem boys, (4) Risk factors, (5) Psychopathy, (6) Impulsivity, (7) Personality traits, (8) Emotions, and (9) Service delivery. Studies to be reviewed vary in terms of the years of data included, and do not span the total length of the study because of the lag between data collection and data analyses.

THE PITTSBURGH YOUTH STUDY

The Pittsburgh Youth Study, compared to most other studies, has the advantage that it started with preadolescent samples (i.e., two out of the three samples), in a period of life in which few mental health problems are already present (e.g., attention deficit and hyperactivity, anxiety), and in which other mental health problems tend to emerge (e.g., CP, depressed mood). Second, many previous studies had relatively small samples, making it difficult to trace the antecedents and causes of relatively low prevalence mental health problems. Third, attrition in many longitudinal studies is relatively high (Capaldi & Patterson, 1987), which by necessity affects statistical power and casts doubts on the validity of conclusions drawn from the data. Lastly, many studies have only two or three assessments spaced over many years. This makes it difficult to trace the development of problem behaviors and the duration of exposure to risk factors, which can be achieved more efficiently by regular assessments of risk factors *and* outcomes at frequent (e.g., yearly) intervals.

These were the main reasons for us to start the Pittsburgh Youth Study in 1987, a prospective longitudinal survey of the development of juvenile mental health problems, delinquency, and drug use, and their risk factors in three samples of inner-city boys. The current paper concentrates on the development of mental health problems from elementary school age to adolescence, as well as psychopathy and personality traits. This review covers research published in approximately the first 14 years of the study. The paper is a companion paper to a chapter summarizing findings on delinquency in the Pittsburgh Youth Study (Loeber et al., in press). Readers interested in findings on mental health in our companion longitudinal study on clinic referred boys (called the Developmental Trends Study) are referred to Loeber, Green, Lahey, Frick, and McBurnett (2000).

Participants in the Pittsburgh Youth Study consisted of three samples of preadolescent and adolescent boys. The first assessment measured life-time behaviors up to that point; subsequent assessments were carried out at half-yearly intervals (later changed to yearly intervals) without interruption in data collection (Table I). The sample size was large, and attrition has been low (see below). The study regularly measured risk factors and antisocial behavior at all follow-up assessments. These aspects and other features of the Pittsburgh Youth Study are discussed later in more detail.

A crucial activity over the past decade has been to ensure that the study's funding remained intact. The study was originally funded by the Office of Juvenile Justice and Delinquency Prevention (OJJDP), and data collection began in 1987–88. Since that time the participants have been followed up regularly, and two books (Loeber et al., 1998a; Stouthamer-Loeber & Van Kammen, 1995) and 85 papers have been published or are in press, which used data from the study. Currently, the study is supported by OJJDP, the National Institute of Mental Health (NIMH), and the National Institute on Drug Abuse (NIDA). This report summarizes the major findings on juvenile mental health problems, psychopathy, and personality

Table I. Design and Sequence of Assessments in the Pittsburgh Youth Study

	C1/C2																							
	1987/88		1988/89		1989/90		1990/91		1991/92		1992/93		1993/94		1994/95		1995/96		1996/97		1997/98		1998/99		1999/2000		2000/01	
	Sp	Fa	Sp	Fa	Sp	Fa	Sp	Fa	Sp	Fa	Sp	Fa	Sp	Fa	Sp	Fa	Sp	Fa	Sp	Fa	Sp	Fa	Sp	Fa	Sp	Fa	Sp	Fa
Youngest sample																												
Age	7	7.5	8	8.5	9	9.5	10	10.5	11		12		13		14		15		16		17		18		19		20	
Assm.	S	A	B	C	D	E	F	G	H		J		L		N		P		R		T		V		Y		AA	
Middle sample																												
Age	10	10.5	11	11.5	12	12.5	13																					
Assm.	S	A	B	C	D	E	F																					
Oldest sample																												
Age	13	13.5	14	14.5	15	15.5	16.5		17.5		18.5		19.5		20.5		21.5		22.5		23.5		24.5		25.5			
Assm.	S	A	B	C	D	E	G		I		K		M		O		Q		SS		U		W		Z			

Note. C1—Cohort 1 assessments (oldest third of sample); C2—Cohort 2 assessments (other two thirds of sample); Sp—Spring; Fa—Fall; Assm.—Assessment.

traits from the first 14 years of the study with reference to the original publications.

In addition to the main longitudinal assessments of the Pittsburgh Youth Study shown in Table I, a few substudies have been executed to examine specific issues in more detail. One of these substudies, particularly relevant to this report, was undertaken by Moffitt and colleagues and focused on boys from the middle sample, who were intensively assessed on neuropsychological, impulsivity, and personality measures in the summer of 1990, when they were on average 12–13 years old.

Participants

Participant selection and methods of the main Pittsburgh Youth Study have been described in detail elsewhere (Loeber et al., 1998a; Loeber, Stouthamer-Loeber, Van Kammen, & Farrington, 1991), and are only briefly summarized here. Boys attending the first, fourth, and seventh grades in the public school system in inner-city Pittsburgh (about 1,000 in each grade) were randomly selected from schools across the city. Of those families contacted, 85% of the boys and their parents agreed to participate. An initial screening (S) assessment then followed to identify high risk participants. About 850 boys were screened in each grade at average ages of 7, 10, and 13.

The information from this screening assessment was used to identify boys with the most severe disruptive behavior problems (approximately 30% or 250 boys in each of the three samples). Additionally, a random selection of boys from the remaining 70% of each sample was made (approximately another 250 boys in each follow-up sample). This selection process resulted in approximately 500 boys in each follow-up sample (503, 508, and 506 in the youngest, middle, and oldest samples, respectively), half high risk and half average or low risk, and just over half were African American, and just under half were White (Loeber et al., 1998a).

Design

The boys as well as their parents were initially followed up at half-yearly intervals (nine assessments for the youngest sample, seven for the middle sample, and six for the oldest sample), after which only the youngest and oldest samples were followed up at yearly intervals (see Table I). The middle sample was discontinued at age 13 because of the age overlap with the other two samples, but is currently being followed up at age 22. Data were also collected from teachers at each wave of the youngest and oldest samples until age 16 (and for the middle sample until age 13). As shown in Table I, each assessment wave is denoted by a letter, starting with S (screening), followed by A, B, C, and so forth.

In total, the youngest and oldest samples constitute one of the most extensively followed-up samples during late childhood, adolescence, and early adulthood in the United States with information about delinquency, substance use, and mental health problems. The youngest sample has now been followed up a total of 17 times (from age 7 to 20), with the 18th assessment currently being completed. The oldest sample has been followed up 16 times (from age 13 to 25). There are no gaps in the follow-ups of these samples, which makes it possible to reconstruct the boys' lives in a cumulative manner. We are planning to undertake further follow-ups, but at intervals of several years rather than yearly.

Data Collection

The Interviewing Process

Practical aspects of data collection and management in the Pittsburgh Youth Study have been described in several publications (Stouthamer-Loeber, 1993; Stouthamer-Loeber & Van Kammen, 1995; Stouthamer-Loeber, Van Kammen, & Loeber, 1992; Van Kammen & Stouthamer-Loeber, 1997). Data collection was organized and controlled in-house (Stouthamer-Loeber & Van Kammen, 1995). We believe that the quality and completeness of data would have been lower if the interviewing process had been contracted out to an agency. Furthermore, we believe that it is important for principal investigators and analysts to have close and continuing contact with the data collection process, so as to become fully aware of all the decisions made at key choice points as well as of the strengths and weaknesses inherent in the data.

The data collection process was a very labor-intensive task. Each year, there were 9,000 assessments (500 boys $\times$ 3 samples $\times$ 2 assessments $\times$ 3 informants), each containing several different questionnaires and hundreds of variables. It was necessary to coordinate about 30–40 part-time interviewers and 10 data entry staff, in addition to other staff involved in data checking and making constructs

and documentation. All these people were organized by three supervisors, and ultimately by Magda Stouthamer-Loeber, Welmoet Van Kammen, and more recently Rose Jarosz, who shared the major responsibility for data collection. From 1994–95, the information from participants was entered directly on laptop computers carried by interviewers, but the transition from paper-based to fully computerized data collection was a painful process that consumed many more person-hours than anticipated.

Interviewers

Interviewers were carefully selected and trained. Generally, the best interviewers were streetwise, self-confident people who had some previous experience at interviewing. Students were considered less unsuitable because their studies and other time commitments (e.g., to complete term papers and vacations) conflicted with the requirements of interviewing (e.g., to be available to conduct interviews at unpredictable times according to the convenience of participants). Interviews were generally conducted in the participant's homes. Interviewers included males and females and Whites and African Americans; there was no attempt to match characteristics of interviewers to those of participants. Despite the fact that many interviews were carried out in high-risk areas, where violence and even shootings were not uncommon, no interviewer was ever a victim of violence while interviewing. This was at least partly attributable to the safety training that was given to all interviewers.

To contain costs of the interviews, interviewers were paid per interview, and the fee included an element of expenses to cover the average mileage required to track down the participant and complete the interview. Names of participants were released to interviewers in batches; interviewers were not given the next batch until the supervisor was satisfied that they had tried all possible avenues for interviewing more difficult to find and the more difficult to schedule participants. This was done to maximize the response rate and to prevent interviewers from concentrating on the "easy" cases so as to maximize their fees and minimize their efforts.

Interviewers were very carefully supervised using a computerized scheduling system. They had regularly scheduled weekly meetings with supervisors and also had to call the supervisor's answering machine every day for messages. All contacts and attempts to contact participants were recorded. At least 10% of all interviews were randomly selected for validation telephone calls to check that the interview really happened and to collect information on interviewer behavior. Data entry and checking occurred within 1 week of each interview to detect missing data. It was then the responsibility of the interviewer to recontact the participant to obtain the missing data. Two interviewers were dismissed after we found that they had taken shortcuts in retrieving missed questions. Interviewers were not paid until the interview information was complete.

More interviewers were hired than were actually needed, and those whose performance did not reach the specified standards (e.g., in number of completed interviews, percentage of errors, percentage of refusals, missed mandatory contacts with supervisors) were let go after 1 month. To minimize interviewer bias, interviewers did not interview the same participant at consecutive assessments.

Many of the more delinquent boys were difficult to locate because their living circumstances were not stable. They might be sleeping at the home of their operative mother on some days, at the home of a father figure on other days, and on a friend's floor on other days. Some participants had a bewildering variety of names and aliases. A child might be listed on his birth certificate as Nathaniel Augustus Jones, but Mr Jones senior may have disappeared soon after Nathaniel's birth, and the child may have then used his mother's maiden name as his last name, or some of the last names of his mother's male partners.

Interviewers were required to search diligently for participants and were trained in methods of overcoming their reluctance to cooperate. Fortunately, Pittsburgh is a relatively stable city, but sometimes the tracking process was long and frustrating. Even when participants moved long distances away from Pittsburgh, interviews were accomplished by telephone.

Attrition

Many studies show that the most elusive and uncooperative respondents tend to be disproportionately delinquent and antisocial (e.g., Farrington, Gallagher, Morley, Ledger, & West, 1990). Hence the loss of respondents is especially serious and likely to produce misleading and invalid results in studies focusing on delinquent or antisocial behavior. Methods of dealing with missing data (e.g., by imputation) are

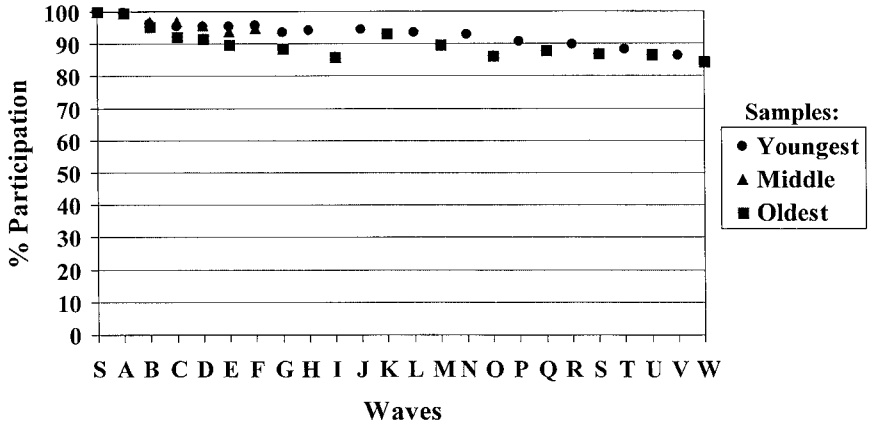

Fig. 1. Cooperation rate across waves.

a very poor substitute for collecting as complete data as possible in the first place. Therefore, we felt it was essential to maximize the initial response rate and also the rate of retaining participants subsequently in the study.

The initial response rate in the screening assessment (S) in the Pittsburgh Youth Study was 85%, and required cooperation from *both* the parent and the boy. Subsequent retention rates were high (Fig. 1) never falling below 83% in the youngest and oldest samples over 18 and 16 assessments, respectively. The cooperation rate in the Pittsburgh Youth Study compares favorably with that in other longitudinal studies on antisocial child behavior. A review of such studies by Capaldi and Patterson (1987) showed a range of participation rates from 52 to 100%, with a median of 75%. In most of the reviewed studies, however, only the permission of one person (e.g., the parent) was requested, whereas in our study either the parent or the boy could refuse.

We have checked for differential participation rate across the assessment phases (14 phases for the youngest sample and 13 for the oldest). Initial risk status, race, socioeconomic status, and serious delinquency were checked for differential participation. We found only 7 significant differences out of a total of 108 comparisons, which is about one would expect by chance alone (Wei, 2001). Thus, we did not find consistent evidence for selective attrition of participants in the study.

Every effort was made to maintain a high cooperation rate of participants at follow-up. There was extensive training of interviewers, who were taught how to deal with reluctant families, and how to find families who did not reside at the recorded address (for details, see Stouthamer-Loeber & Van Kammen, 1995). In addition, boys and parents were paid for each interview, and we believe that this was important in maximizing the response rate. The parents were initially paid $12.50, with an additional $5 for boys in the oldest sample, and these fees were increased gradually. Currently, we pay $85 to the participant per assessment.

Teacher Cooperation

For each participating boy a teacher was requested to complete a questionnaire. The school district administration did not allow us to pay teachers. It was, therefore, very important that our contacts with the schools were positive, and we took several steps to make the collaboration of the schools more rewarding for school personnel. Principals were visited first, and the procedure for the data collection was discussed with them. Then a letter was sent to the teachers, letting them know that a study involving students from their school was in progress, and that we would be in touch with them at a later point. When we were ready to bring the booklets to the school, an appointment was set up with the teachers in which the study was explained, the booklets were distributed, and a date was set to pick them up. In general, principals and secretaries proved vital in achieving the data collection in schools. Teacher participation was high up to age 16, averaging 89% for the youngest sample from waves S through P, 89% for the middle sample from waves S through F, and 88% for the oldest sample from waves S through D. From age 16, teacher participation rates fell in the youngest and oldest samples to 51–73% largely because teachers had become

less familiar with their students by that age and the dropout of some students.

Measures and Principal Constructs

As far as possible, we used existing measurement instruments; however, a large number of measures had to be specially developed or modified using language suitable for an urban, and lower socioeconomic class sample. Some of these new measures were derived from earlier work at the Oregon Social Learning Center. In addition, several measures resulted from collaboration among investigators of the OJJDP Program of Research on the Causes and Correlates of Delinquency (Terence P. Thornberry, Alan J. Lizotte, Margaret Farnworth, and Susan B. Stern in Rochester; David Huizinga, Finn Esbensen, and Delbert S. Elliott in Denver).

Most of the measures used in the first two waves can be found in Loeber et al. (1998a), and the most relevant ones in subsequent waves are discussed below. The Revised Diagnostic Interview Schedule for Children (DISC-P) (Costello, Edelbrock, Kalas, Kessler, & Klaric, 1982) was administered to the parent at wave A. This was developed as a measure of child psychopathology to be administered by lay interviewers in epidemiological surveys. It covers most forms of child psychopathology contained in *DSM-III* and *DSM-III-R* (American Psychiatric Association [APA], 1982, 1987), as well as the age at which the problem behaviors were first noted. Not covered were relatively rare disorders such as psychosis and anxiety in boys. To measure dimensional aspects of mental health problems, parents and teachers were given the respective forms of the Achenbach Child Behavior Checklist (CBCL), the CBCL for the parents and the TRF for the teachers (Loeber et al., 1998a). The Youth Self-Report, a child equivalent of the CBCL, was administered to boys over age 10. Constructs based on these measures include internalizing and externalizing problems in general, and more specifically, physical aggression, shy/withdrawn behavior, and anxious/fearful behavior (see Loeber et al., 1998a).

Because parents or teachers are usually not good judges of children's depression, the boys were administered the Recent Mood and Feelings Questionnaire (MFQ). This 13-item scale, developed by Angold and associates (Angold & Costello, 1995; Costello & Angold, 1988; Messer et al., 1995), is a measure of children's depression to be used in epidemiological studies. The time frame covered the previous 2 weeks.

The substudy on the middle sample by Moffitt and colleagues had several unique measures that were not included in the regular assessment waves. The measures for the substudy included the Childhood Psychopathy Scale (CPS) to measure psychopathy in childhood (Lynam, 1996, 1997, 1998), and a new childhood measure of the "Big Five" Personality Scale, administered to the boys by means of a Q-sort technique (Caspi, 1998). In addition, the substudy focused on the measurement of *impulsivity* with the use of 11 instruments (see below).

Finally, this review highlights a wide range of risk factors that are briefly mentioned below, in the following domains: child, family process, family demographics, and neighborhood factors (for details, see Loeber et al., 1998a). The risk factors for each domain are identified in the Results section.

RESULTS

Epidemiology

Mental Health Problems and Disruptive Behavior Disorders

What is the prevalence of mental health problems in the sample as reported in the parent version of the CBCL? Mental health problems were defined if the boy scored in the top 10% of the distribution of internalizing or externalizing symptoms on the CBCL (Huizinga, Loeber, Thornberry, & Cothern, 2000). Results showed that 5.7% of the boys with persistent serious delinquency also had persistent mental health problems *and* displayed persistent drug use (persistence defined as a high score over 2 out of 3 years).

Table II summarizes the prevalence of disruptive behavior disorders (oppositional defiant disorder

Table II. Prevalence of *DSM-III-R* Disruptive Behavior Disorders at Wave A

	Sample (%)		
	Youngest	Middle	Oldest
Disruptive behavior disorder	16.3	14.8	14.9
Oppositional defiant disorder	2.2	4.8	5
Conduct disorder	5.6	5.4	8.3
ADHD	15.2	10.5	7.6

Note. Prevalence rates have been corrected for screening (Loeber et al., 1998b).

[ODD], conduct disorder [CD], and ADHD) for the three samples at wave A. About 15–16% of boys across the three samples qualified for a diagnosis of disruptive behavior disorder with the use of *DSM-IIIR* criteria (APA, 1987; Loeber et al., 1998a). The prevalence of mental health problems in the samples was enhanced by the screening at the first assessment. For that reason, prevalence figures here are corrected for the screening procedure and represent population estimates for boys from Pittsburgh public schools in their respective grades. The prevalence of ODD doubled between the youngest and the middle-oldest samples, especially between ages 7 and 10. As expected, the prevalence of CD also increased with age, especially between ages 10 and 13.[6] In contrast, the prevalence of ADHD decreased with age from 15% at age 7.5 to 8% at age 13.5. These trends also are evident from the continuous symptom scores for each of the disorders (Loeber, Farrington, Stouthamer-Loeber, Moffitt, & Caspi, 1998).

Alternative Diagnostic Classification

The data set was also used to undertake preliminary analyses for the development of *DSM-IV* (American Psychiatric Association, 1994) to examine (a) symptom discrimination between diagnoses of ODD and CD; (b) whether severity distinctions between mild, moderate, and severe CD could best be interpreted in the context of co-occurring ODD symptoms; and (c) whether an alternative and developmentally more appropriate diagnostic schema could be constructed (for details, see Russo, Loeber, Lahey, & Keenan, 1994).

Analyses were carried out on data from the oldest sample. The findings showed that the symptoms "swearing," "touchy," and "spiteful" did not discriminate between ODD and CD. The CD symptom of "lying" was more associated with the diagnosis of ODD. Symptom discrimination and disorder validation analyses supported three instead of two levels of disruptive behavior disorders. The mutually exclusive levels consisted of modified ODD, intermediate CD, and advanced CD. The prevalence of the modified diagnoses at age 13.5 were as follows: 7% qualified for modified ODD, 2% for intermediate CD, and 4% for advanced CD.

[6]Because of some computational differences, Russo et al. (1994) published a prevalence rate of 10% for ODD and 8.4% of CD in the oldest sample.

Table III. Three Categories of Disruptive Behavior and Their Symptoms (Russo et al., 1994)

Modified ODD	Intermediate CD	Advanced CD
Loses temper	Steals (covert)	Vandalism
Defies adults	Starts fights	Uses weapon
Argues	Bullies[a]	Break and enter
Blames others	Hits students[a]	Sets fires
Annoys others		Runs away
Lies		Threatens[a]
Cruel to animals		
Truant		
Rough in play[a]		

[a]Symptom not formerly in *DSM-IIIR*.

One of the principal advantages of the three-level formulation of disruptive behavior disorders was that it allowed a better and more discriminating assessment of individual boys' progression from less serious to more serious symptoms of disruptive behavior disorders. For example, the symptoms of "bullies"[7] and "rough in play," which had been designated as CD symptoms in *DSM-IIIR*, proved more characteristic of intermediate CD, and functioned better as precursors to more serious forms of aggression (Russo et al., 1994). Table III shows the assignment of symptoms to each of the three levels. Some symptoms are omitted from Table III because their low base rate made it impossible to compute their discriminating power between the three diagnostic levels.

In general, there is support for the classification of boys with disruptive behavior into at least three developmentally oriented categories, reflecting the natural course of development of the symptoms of CP. Another advantage of a triple compared to a dual ODD–CD distinction of disruptive behavior disorder (as in *DSM-IIIR* or *DSM-IV*) is that it offers a finer distinction relevant for preventive interventions.

It can be objected that the proposed classification is yet another classification among many others, and that it does not relate to developmental pathways in disruptive and delinquent child behavior that also are based on findings from the Pittsburgh Youth Study (e.g., Kelley, Huizinga, Thornberry, & Loeber, 1997; Loeber et al., 1993; Loeber, Wei, Stouthamer-Loeber, Huizinga, & Thornberry, 1999; see Loeber et al., in press, for a summary of findings). Although the two approaches differ in the number of types of categories of behavior, they share a hierarchical, developmental approach in which earlier stages of disruptive behavior constitute a necessary stepping-stone to more

[7]New symptoms in *DSM-IV*.

serious and later occurring stages of disruptive and, eventually, delinquent behavior.

Physical Aggression

Among all disruptive behaviors, we consider physical aggression a key symptom for boys' escalation in both overt and covert antisocial acts (Loeber et al., 1993). A comparison of the average physical aggression score at wave A did not show significant differences between the three samples (Loeber et al., 1998a). Also, longitudinal analyses (Fig. 2) showed that the prevalence of physical aggression remained fairly constant between ages 6 and 17 (Loeber & Hay, 1997). From ages 6 through 14, the annual prevalence of physical aggression was in the 10–17% range; only after age 15 did this prevalence decrease.

We cannot assume that all of those who were fighters at time 1 were also fighters at time 2. In fact, most changes in individuals' fighting status tended to occur in midchildhood. This is demonstrated in Fig. 3 showing the yearly stability of physical aggression in the youngest sample. The year-to-year Odds Ratio for physical aggression was 10.3 at ages 6–7, but it almost doubled by ages 9–10 to 19 (Loeber & Hay, 1997). The cumulative onset graphs show that physical aggression (which includes gang fighting) increases with age in each of the three samples (Loeber et al., 1993; Loeber & Stouthamer-Loeber, 1998).

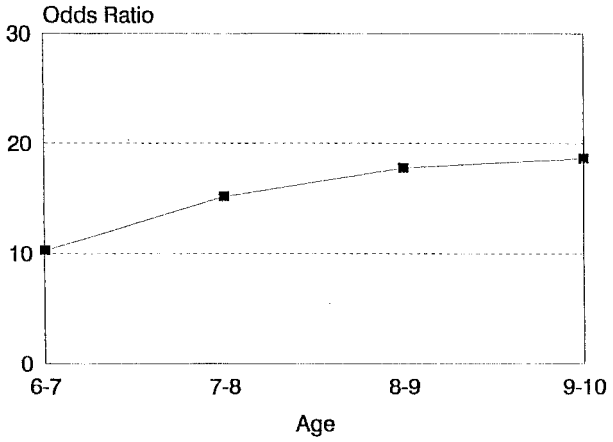

Fig. 3. Yearly stability of physical aggression (Loeber & Hay, 1997).

A key issue to be kept in mind about the above findings is that knowledge of prevalence, stability, and cumulative onset can all contribute to information about naturally occurring subgroups of aggressive youth: those who are fairly stable from childhood to adolescence (and possibly adulthood), those who become aggressive, those who desist from aggression, and finally, those whose aggression worsens into violence. Boys' escalation from physical fighting to violence has been conceptualized as part of an overt pathway that often starts with annoying others and bullying prior to the onset of physical fighting (for a

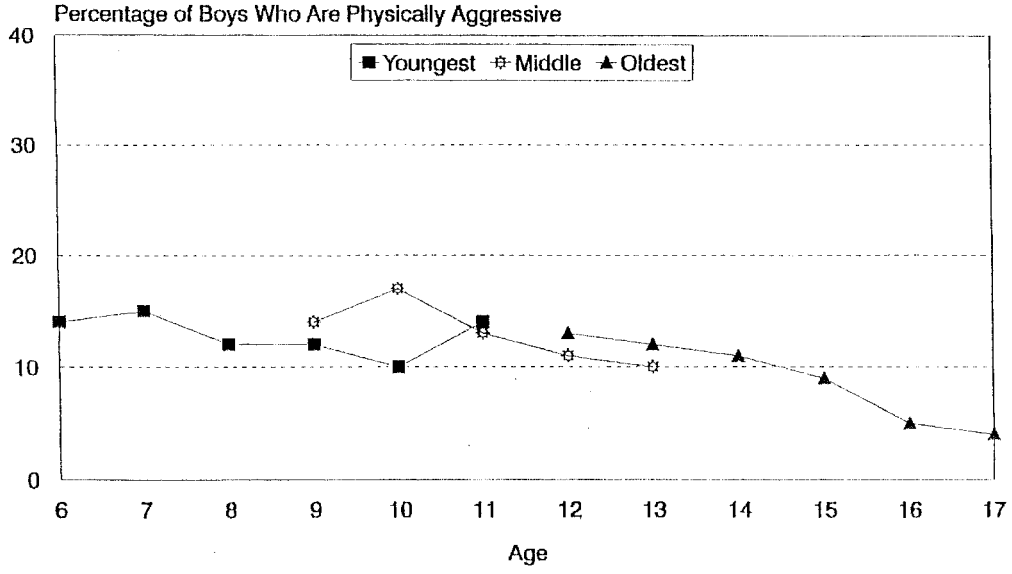

Fig. 2. Prevalence of physical aggression from ages 6 to 17 (Loeber & Hay, 1997).

discussion of pathways toward serious antisocial outcomes, see Loeber et al., in press).

Internalizing Problems

Depressed Mood

It is well known that the prevalence of depression in girls but not in boys increases during adolescence (Angold et al., 1996). Few studies, however, have examined depression or depressed mood during the preadolescent years or changes in shy/withdrawn behavior or anxious/fearful behavior. An investigation undertaken by Angold et al. (1996) found that in boys depressed mood was highest during middle childhood and then tended to decrease. This is evident from cross-sectional comparisons at wave A between the three samples, with the average depressed mood score significantly decreasing from 7.4 in the youngest sample, to 6.0 in the middle sample, and to 4.0 in the oldest sample (Loeber et al., 1998a). Subsequent longitudinal analyses over four annual interviews confirmed these results. As shown in Fig. 4, there was a substantial decrease in reported depressive symptoms between the ages of 8 and 11. The results also

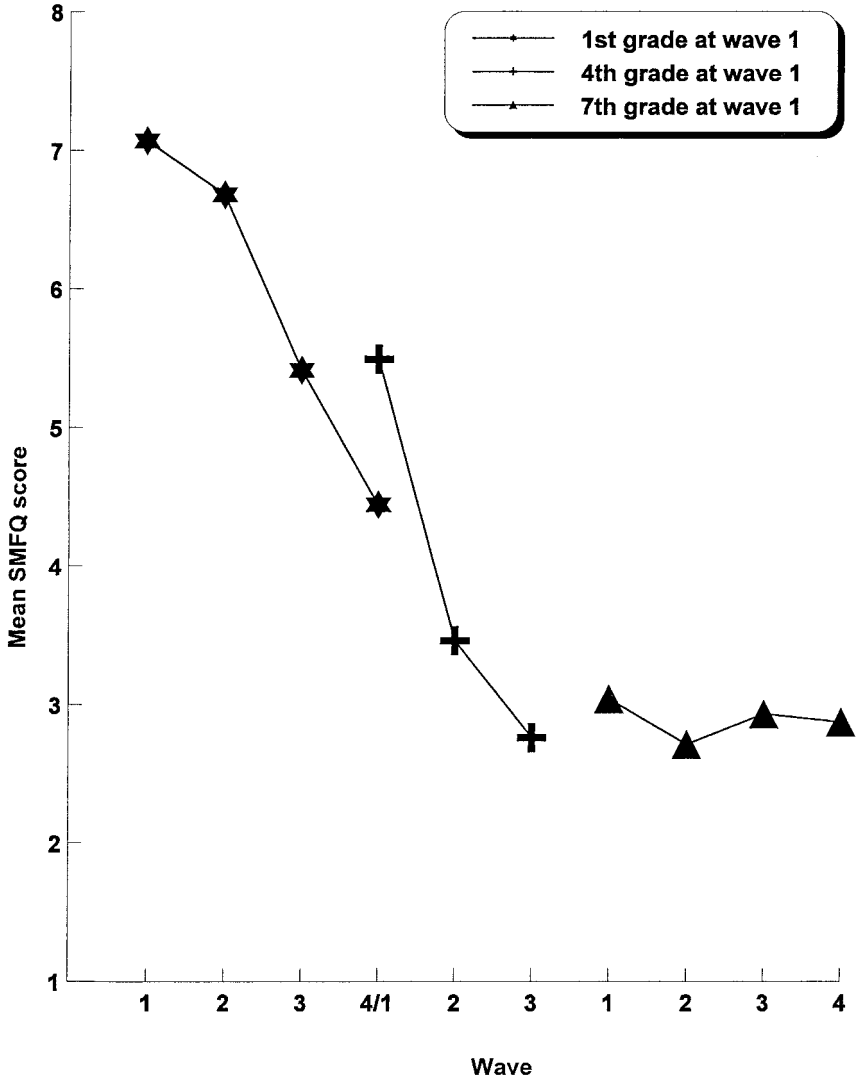

Fig. 4. Reported depressive symptoms from ages 8 and 11 (Angold et al., 1996).

held when the percentage of the population with a depressed mood score above the 95th percentile was considered (Angold et al., 1996).[8] Depressed mood was also one of the correlates of the initiation of offending, but this was found for the middle sample only (Loeber et al., 1991).

Shy/Withdrawn Behavior

In contrast to depressed mood, we found that shy/withdrawn behavior significantly increased with age, judging from comparisons of the continuous symptom scores of the three samples at wave A (an average of 4.1 for the youngest sample, 4.3 for the middle sample, and 4.4 in the oldest sample; Loeber et al., 1998a). Shy/withdrawn behavior was one of the correlates of the initation of offending in late childhood (youngest sample), but not at a later age (Loeber et al., 1991).

Anxious/Fearful Behavior

The anxious/fearful behavior score tended to decrease with age, at least judging from cross-sectional comparisons at wave A, that is, from an average of 3.9 in the middle sample to 3.6 in the middle sample, and to 3.3 in the oldest sample (Loeber et al., 1998a). Anxious/fearful behavior was not a correlate of either initiation or escalation of offending (Loeber et al., 1991).

Interrelations Between Externalizing and Internalizing Problem Behaviors

The risk score enriched the sample with high-risk boys and was based on an index of reports by the boy, his parent, and teacher on antisocial (externalizing) problems. To what extent did boys scoring high on this risk score also score high on other areas of psychopathology? Fabrega, Ulrick, and Loeber (1996) investigated in the oldest sample to what extent the risk score was related to CBCL scores based on items shared by the respective CBCL forms for children, parents, and teachers. Remarkably, all three informants agreed that high-risk compared to low-risk boys scored high on three scales: anxious–depressed, social problems, and thought problems. In addition, boys and their parents agreed that this was the case for the withdrawn scale. Thus, the screening procedure tended to identify individuals at risk for co-occurring externalizing and internalizing problems.

Loeber et al. (1998a) further investigated to what extent different types of problem behavior are interrelated, and hence, how far they might all be symptoms of the same underlying syndrome. Six major types of problem behavior were studied: high ADHD symptom score, high Conduct Problem score (here called CP), physical aggression, covert behavior problems, depressed mood, and shy/withdrawn behavior. The DISC also yielded a high ODD score. However, this was very highly related to the ADHD score (odds ratio [OR] = 12.8–14.1) in the three samples (see Loeber et al., 1998a). Therefore, ODD was not studied separately. The overlap between the ADHD and CP was less (OR = 5.2–7.5), and so these were investigated separately. All variables were dichotomized, and the main measure of strength of effect was the OR. As a rule of thumb, ORs between 1.0 and 1.5 are nonsignificant, those between 1.6 and 1.9 indicate weak relationships, those between 2.0 and 2.4 indicate moderately strong relationships, those between 2.5 and 3.4 indicate strong relationships, and those of 3.5 or greater indicate very strong relationships.

ADHD and CD diagnoses were also derived from the DISC, based on *DSM-III-R*. The ADHD diagnosis required at least 8 out of 14 specified symptoms, whereas the CD diagnosis required at least 3 out of 13 specified symptoms (and, in both cases, also a disturbance lasting at least 6 months).

Loeber, Russo, Stouthamer-Loeber, and Lahey (1994) related the ADHD and CD diagnoses to measures of stable depressed mood and stable shy/withdrawn behavior (which depended on repeated identification during the first six data waves in the middle and oldest samples). Both diagnoses were significantly correlated with both measures, except for the association between CD and stable depressed mood in the middle sample. They concluded that there was greater comorbidity between ADHD and the internalizing problems than that between CD and the internalizing problems.

Loeber, Farrington, Stouthamer, and Van Kammen (1998b) reported interrelationships among the six major types of problem behavior. Generally, most behaviors were significantly interrelated, with ORs at least 2.0. However, depressed mood was the least related to the other five problems; for depressed mood, only 4 out of 15 ORs in the three samples were

[8]The prevalence of DISC diagnoses of depression were too low to be included here.

2.0 or greater. The figures for the other problems were as follows: ADHD 14 out of 15, CP 12 of 15, physical aggression 11 out of 15, covert behavior problems 12 out of 15, and shy/withdrawn behavior 11 out of 15. It was clear that ADHD, CD, physical aggression, and covert behavior problems (all considered externalizing problems) were strongly interrelated; all ORs exceeded 3.0, 16 exceeded 4.0, and 10 exceeded 5.0. In contrast, the highest OR involving depressed mood was 2.3 (with ADHD), and the highest OR involving shy/withdrawn behavior was 3.4 (with covert behavior problems).

Loeber et al. (1998b) carried out a factor analysis of eight problem behaviors (the six major ones reviewed here plus delinquency and substance use). All eight behaviors had substantial weightings on the first factor, in agreement with the idea that they were all symptoms of the same underlying syndrome. However, weightings on the second factor distinguished delinquency and physical aggression at one extreme from depressed mood and shy/withdrawn behavior at the other extreme. Therefore, the results support the idea of distinct (but intercorrelated) internalizing and externalizing syndromes.

However, the factor analysis was done on cross-sectional data. Longitudinal data shows considerable diversity in developmental trends in the prevalence of different problem behaviors (e.g., Angold et al., 1996; Loeber et al., 1993). For example, depressed mood and ADHD symptoms tend to decrease after middle childhood, whereas delinquency and substance use tend to increase during late childhood and adolescence. This implies that interrelations between different problem behaviors are likely to change with age.

Multiple Problem Boys

Boys with four or more problem behaviors out of eight (20–25% of boys) were identified as multiple problem boys. Being a multiple problem boy was especially related to covert behavior problems, ADHD, CP, and physical aggression, and much less to shy/withdrawn behavior and depressed mood. Therefore, the multiple problem boys were largely boys characterized by externalizing problems.

RISK FACTORS

Which risk factors are related to boys' mental health problems? Loeber et al. (1998a) reported explanatory variables that predicted a high ADHD symptom score, CP, physical aggression, covert behavior problems or deceitfulness/untrustworthiness, depressed mood and shy/withdrawn behavior, as well as delinquency. All explanatory and outcome variables were measured at waves S and A, and most were based on combined ratings by boys, mothers, and teachers. We will briefly address the following questions: (a) Which risk factors in the realms of the child, family processes, family demographics, and neighborhood predict which mental health problems? (b) Which risk factors are shared among different mental health problems, particularly within and between externalizing and internalizing categories of problem behaviors?

Child Risk Factors

The boy's lack of guilt feelings was the strongest predictor of ADHD (OR = 4.0–5.5 across the three samples), physical aggression (OR = 5.0–6.5), and covert behavior problems (OR = 4.7–6.2), just as it had also been the strongest predictor of delinquency (OR = 3.4–4.7). It is plausible to hypothesize that lack of guilt measures low internal inhibition, and that low internal inhibition is a causal factor in externalizing behavior. Lack of guilt was also the strongest predictor of CP in the youngest (OR = 5.5) and middle (OR = 5.1) samples, but not in the oldest sample (OR = 2.8). Low school achievement, poor parent–boy communication, and high parent stress (all OR = 3.2) were the strongest predictors of CP in the oldest sample. Lack of guilt was quite strongly related to shy/withdrawn behavior and was the strongest predictor of shy/withdrawn behavior in the youngest sample (OR = 2.7). The strongest predictor of shy/withdrawn behavior in the middle sample was poor parent-boy communication (OR = 2.3) and in the oldest sample was low school achievement (OR = 2.8). Lack of guilt was not related to depressed mood.

Low school achievement (rated by boys, mothers, and teachers) was a strong predictor of ADHD, CP, and covert behavior problems and a quite strong predictor of physical aggression, depressed mood, and shy/withdrawn behavior. Low school achievement was the only explanatory variable that was significantly related to all six outcomes in all three samples. It was also a quite strong predictor of delinquency (OR = 1.7–2.6; see also Maguin & Loeber, 1996; Maguin, Loeber, & LeMahieu, 1993).

Family Process Factors

Of all the family variables, poor parent-boy communication was the most important predictor of the six outcomes. It was only measured in the middle and oldest sample but was significantly related to all six outcomes in both samples. It was a particularly strong predictor of covert behavior problems (OR = 3.8, 4.1), ADHD (OR = 3.6, 3.4), and CP (OR = 3.4, 3.2). It was the strongest predictor of depressed mood in the middle sample (OR = 3.3).

Poor parental supervision was strongly related to covert behavior problems in the oldest sample (OR = 3.3), quite strongly in the middle sample (OR = 2.0), and not significantly in the youngest sample. It was quite strongly related to CP in all three samples (OR = 2.1–2.9) but not related to depressed mood or shy/withdrawn behavior.

The mother's physical punishment was very strongly related to physical aggression in the oldest sample (OR = 4.6) but only weakly in the other two samples (OR = 1.5, 2.0). This is in agreement with the theory that violence is transmitted from parents to children. Harsh physical punishment was quite strongly related to depressed mood in all three samples (OR 1.9–2.1) but not at all to shy/withdrawn behavior. Physical punishment and poor parent-boy communication were the strongest predictors of depressed mood in the oldest sample (OR = 1.9).

High parent stress was significantly related to CP (OR = 1.8–3.2) and covert behavior problems (OR = 2.2–3.5) in all three samples. In both cases, the strongest relationship was in the oldest sample. High parent stress was more weakly related to physical aggression (OR = 1.8–2.6) and shy/withdrawn behavior (OR = 1.7–1.9) in all three samples.

Parent substance use problems were quite strongly related to CP in all three samples (OR = 2.0–3.4). Parent anxiety/depression was related (less strongly) to ADHD (OR = 1.9–2.0) and CP (OR = 1.6–2.5) in all three samples. Parent anxiety/depression was not strongly related to depressed mood or shy/withdrawn behavior. Behavior problems of the father were quite strongly related to CP in all three samples (OR = 2.1–2.8), again showing intergenerational transmission of externalizing behaviors.

Family Demographic Factors

Generally, family demographic factors were less strongly related to the six outcomes than were the child or family process factors. The most important family demographic factor was coming from a broken family, which was quite a strong predictor of CP in all three samples (OR = 2.1–2.7), as indeed it had been quite a strong predictor of delinquency in all three samples (OR = 2.0–2.9). It was also a significant but less strong predictor in all three samples of physical aggression (OR = 1.7–2.2) and covert behavior problems (OR = 1.9–2.6). A broken family was the strongest predictor of depressed mood in the youngest sample (OR = 2.7), and it was also a strong predictor of ADHD in the youngest sample (OR = 3.1).

Coming from a family on welfare also predicted CP (OR = 1.6–2.2) and covert behavior problems (1.6–1.8) in all three samples, as indeed it had predicted delinquency in all three samples (OR = 2.1–2.5). Having a young mother (under age 20 at the time of the boy's birth) was not related to any of the outcomes in any of the samples. The strongest relationship involving low family socioeconomic status (SES) was with CP in the middle sample (OR = 2.0), whereas the strongest relationship involving race/ethnicity was with depressed mood in the youngest sample (OR = 2.4). Living in poor housing was a quite strong predictor of physical aggression in the oldest sample (OR = 2.0).

Neighborhood

Living in a bad neighborhood, according to the parent, was a quite strong predictor of externalizing problems: Physical aggression in the oldest sample (OR = 2.2), but also delinquency in each of the samples, either measured through parental report or through the census (OR = 1.8–2.1 and 1.8–2.2, respectively). Early CP in the youngest sample were associated with both measures of neighborhood (OR = 1.8 and 2.1, respectively), but this was less consistent in the older samples. ADHD was related to parental report of bad neighborhood in only the oldest sample, but only weakly, and was not related to the census indicator of neighborhood (OR = 1.6).

Finally, depressed mood at a young age (youngest sample) was related to both indicators of bad neighborhood (OR = 1.7 and 2.1, respectively), but not at later ages. The same applies for shy/withdrawn behavior, but only for parental report, and only weakly (OR = 1.5). Thus, internalizing problems were related to neighborhood factors but during the elementary school-age period only.

Risk Factors for Externalizing Versus Internalizing Behaviors

It is instructive to compare predictors of CP and physical aggression (externalizing behaviors) and predictors of depressed mood and shy/withdrawn behavior (internalizing behaviors). Not surprisingly, lack of guilt was much more strongly related to the externalizing behaviors, probably because it reflects low internal inhibition. However, low school achievement was about equally related to externalizing and internalizing behaviors.

Of the family process factors, poor parental supervision, parental anxiety/depression, disagreement on discipline, and behavior problems of the father were more strongly related to the externalizing behaviors. Poor parent-boy communication was quite strongly related to both externalizing and internalizing behaviors. The mother's physical punishment was related to physical aggression and depressed mood, whereas high parent stress was related to CP, physical aggression, and shy/withdrawn behavior. None of the family demographic and neighborhood factors was much related to the internalizing behaviors. A broken family and the family on welfare were not strongly related to the externalizing behaviors. In summary, no single risk factor was uniquely related to internalizing behaviors. However, this may be due to the selection of measured risk factors that in this study was slanted toward the explanation of externalizing rather than internalizing problems.

Cumulative Effects of Risk Factors

For each of the six major problem behaviors Loeber et al. (1998a) computed a risk score based on the most important independent predictors in the three samples. For example, for ADHD in the oldest sample, the risk score was based on seven variables (lack of guilt, depressed mood, anxiety, low achievement, poor parent-boy communication, high parent stress, and parent–anxiety/depression), and each boy was scored from 0 to 7. The risk of ADHD increased steadily with the number of risk factors. Comparing the high risk (4 or more) group with the remainder, the ORs were highest in the youngest (6.1) and middle (5.5) samples and lowest in the oldest sample (4.2). About 50–60% of high risk boys had ADHD problems. Similarly, for CP, the OR for the high risk/remainder comparison was highest in the middle (7.9) and youngest (6.3) samples and lowest in the oldest sample (5.0), and about 55–60% of high risk boys had CP.

The risk score was a better predictor of physical aggression and covert behavior problems. For physical aggression, the ORs were very high (7.7–13.9), and 60–70% of high risk boys were physically aggressive. Again, the prediction was poorest in the oldest sample. For covert behavior problems, the ORs were high (7.5–9.4), and about 60% of high risk boys had such problems.

The risk score was a poorer predictor of depressed mood and shy/withdrawn behavior, suggesting that the explanatory variables measured in the Pittsburgh Youth Study were weaker predictors of internalizing behaviors. For depressed mood, the ORs varied from 3.1 to 5.6, and about 40% of high risk boys had depressed mood. For shy/withdrawn behavior, the ORs varied from 3.4 to 4.6, and about 50–60% of high risk boys had shy/withdrawn behavior. For both depressed mood and shy/withdrawn behavior, the risk score predicted best in the oldest sample.

In conclusion, for all mental health outcomes studied, the higher the number of risk factors, the more likely was the undesirable outcome to occur. It should be noted, however, that a high score did not identify *all* of the boys who had any of the mental health outcomes. Aside from measurement error, this means that to date we have been able to tap into only some of the relevant risk factors.

Risk Factors for Multiple Problem Boys

The strongest predictors of multiple problem boys in all samples were lack of guilt (OR = 5.8–7.3), poor parent-boy communication (OR = 4.0, 4.4), low school achievement (OR = 3.0–3.9), a broken family (OR = 2.2–4.0), high parent stress (OR = 2.0–3.3), poor parental supervision (OR = 2.2–2.9), unhappy parents (OR = 2.0–2.7), and parent anxiety–depression (OR = 2.0–2.7). Lack of guilt, low school achievement, poor parent-boy communication, and high parent stress were independently important predictors in regression analyses (Loeber et al., 1998a, 1998b). In general, family demographic and neighborhood factors did not predict multiple problem boys independently of child and family process factors, suggesting that any effect of family demographic/neighborhood factors in producing

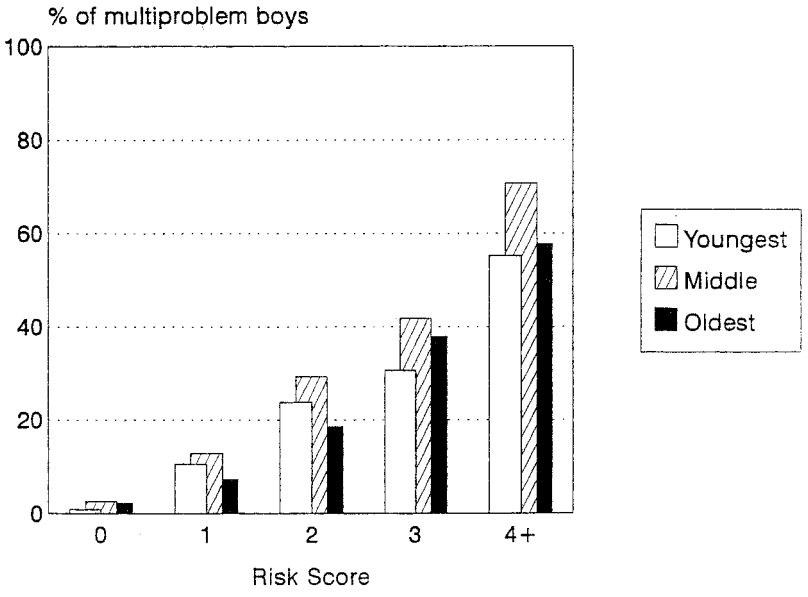

Fig. 5. Percentage of multiproblem boys as a function of increasing risk score (Loeber et al., 1998b).

multiple problem boys operated indirectly through child and family process factors. In particular, African American ethnicity did not predict multiple problem boys; the largest OR in the three samples was 1.6.

The best predictors were summarized in a risk score to predict multiple problem status. The effectiveness of prediction was as good as in the best case above (physical aggression). The ORs were very high (7.3–12.5), and about 55–70% of high risk boys were multiple problem boys. The best prediction was in the middle sample. As shown in Fig. 5, 71% of boys with four or more risk factors became multiple problem boys (OR = 12.5).

PSYCHOLOGICAL FACTORS

Psychopathy

Authors agree that one of the most serious antisocial conditions is psychopathy (Cleckley, 1941; Robins, 1966). Psychopathy, as initially described by Cleckley (1941), is a form of personality disorder. The psychopathic individual is hot-headed; cold-hearted; impulsive; irresponsible; selfish; emotionally shallow; manipulative; lacking in empathy, anxiety, and remorse; and involved in a variety of criminal activities. However, most studies on psychopathy have almost exclusively focused on psychopathy in adults, and few studies have concentrated on early forms of psychopathy in children and adolescents (see Frick, O'Brien, Wootton, & McBurnett, 1994; Lynam, 1996, 1997, 1998). Lynam has studied early psychopathy, using data from the middle sample of the Pittsburgh Youth Study, with the aim to determine if childhood psychopathy fitted into the same nomological network as adult psychopathy. For that purpose, Lynam developed the CPS to operationalize in childhood the hallmark clinical features of psychopathy. Results with the scale in the middle sample showed that psychopathy has a childhood manifestation that can be measured reliably.

Children who scored high on the CPS, like their psychopathic adult counterparts, were the most frequent, severe, aggressive, and temporally stable delinquent offenders. Children who scored high on the CPS were also impulsive, according to a multimethod, multisource battery of measures of impulse control. These children were also prone to externalizing behavior disorders but comparatively immune to internalizing disorders. Most important, the research showed that childhood psychopathy provided incremental validity in predicting serious stable antisocial behavior in adolescence over and above other known predictors and other classification approaches. Further research has shown that boys with symptoms of hyperactivity, impulsivity, and attention problems (HIA) and concurrent CP most closely resembled psychopathic adults (Lynam, 1998). This suggests that childhood ADHD

and CD/ODD are the "nets" in which clinicians and researchers will catch the fledgling psychopath.

Impulsivity

Researchers working from a variety of theoretical perspectives have claimed that impulsivity is an important feature of psychopathy in particular, and disruptive behavior disorders in general. For example, Shapiro (1965) noted that "the psychopath is the very model of the impulsive style" (p. 157), and Cleckley (1941) listed impulsivity as one of the hallmark indicators of the psychopathic personality. Despite agreement about the importance of impulsivity for the study of externalizing problems, progress in this area has been hampered by poor measurement of the construct of impulsivity.

An important goal of the Pittsburgh Youth Study has been to improve the understanding and operationalization of impulsivity. This was accomplished by administering a multisource, multimethod battery of impulsivity measures to boys in the middle sample at age 13. The goals of this project were (a) to examine the interrelations among a variety of different measures of impulsivity, (b) to identify possible underlying dimensions of impulsivity tapped by a variety of different measures, and (c) to determine if different measures of impulsivity are differentially and specifically related to externalizing behavior problems (Krueger, Caspi, Moffitt, White, & Stouthamer-Loeber, 1996; White et al., 1994).

Moffitt and colleagues collected data on 11 different measures of impulsivity. These measures represent the most reliable and valid published methods for assessing individual differences in impulsivity.

Time Perception: This task operationalized the concept of a cognitive tempo by using time estimation and production tasks.

Stroop Color and Word Association Test: The Stroop test assesses the ease with which a participant can inhibit an automatic overlearned response, substituting a competing novel response.

Trail-Making Test: This is a neuropsychological test of the ability to initiate, switch, and stop a sequence of complex purposive behavior that requires attention and concentration skills.

Circle-Tracing Task: This motor task is a simple way of testing motor inhibition in which participants are directed to trace over a 9-in. circle as slowly as they can.

Delay of Gratification: This task is a computer game designed to pit a less desirable but immediate monetary outcome against a more desirable but delayed one.

Card-Playing Task (CPT): This task, also presented as a computer game, operationalizes a disinhibited response style under circumstances that establish a strong positive response set.

The *Eysenck Impulsiveness Scale* is a self-report questionnaire measure of impulsive behavior.

Teacher Reports of Impulsivity were obtained from teachers who rated each boy on six items that measure impulsive behavior (e.g., "fails to finish things he starts," "wants to have things right away").

Ego Undercontrol was measured via parent reports on the common language version of the California Child Q-Sort (CCQ), a language-simplified personality assessment procedure intended for use with nonprofessional lay observers.

Videotape Observations: Testing sessions were videotaped and observed by three trained coders who rated each boy on two dimensions: Motor restlessness and impatience–impersistence. The coders had no knowledge about the participants or hypotheses.

In general, the correlations among the 11 impulsivity measures were low, ranging from −.08 to .33, suggesting that the construct of impulsivity was not unidimensional. However, certain subsets of impulsivity measures were more highly interrelated than others. Exploratory and confirmatory factor-analysis techniques pointed to two correlated but distinct forms of impulsivity.

The first factor appeared to measure impulsivity that was associated with lack of behavioral control. This interpretation is consistent with the finding that the variables with the highest loading on this factor were those that tapped disinhibited, undercontrolled behavior. These were parent-reported undercontrol, observer-rated motor restlessness, teacher-reported impulsivity, self-reported impulsivity, and observer-rated impatience–impersistence. We labelled this factor behavioral impulsivity.

The second factor appeared to measure impulsivity that was associated with effortful and planful cognitive performance. The variables with the highest loadings on this factor were those that tapped mental control and the mental effort required to switch adaptively between mental sets. These variables were trail-making test time, stroop errors, time perception, number of cards played on the CPT, circle tracing, and

delay of gratification. We labelled this factor cognitive impulsivity.

Both cognitive and behavioral impulsivity were significantly and positively related to CP, measured cross-sectionally and prospectively. However, the links between behavioral impulsivity and CP (average $r = .43$, $p < .001$) were stronger than those between cognitive impulsivity and CP (average $r = .18$, $p < .01$). To test the unique contribution of impulsivity to the variance in conduct problems, the effects of individual differences in SES and IQ were statistically controlled. Cognitive and behavioral impulsivity together accounted for 16% of the variance in CP, with the effects of SES and IQ controlled. However, although cognitive impulsivity was not related to CP independently of IQ, individual differences in behavioral impulsivity predicted CP above and beyond individual differences in IQ.

The obtained relation between behavioral impulsivity and CP suggests that children with poor self-control may be more likely to display externalizing behavior problems because they are unable to control or monitor their behavior. Behaviorally undercontrolled individuals may steal and fight on the spur of the moment when the rewards associated with that behavior loom large and when the potential negative consequences seem small and in the distant future.

Personality

Some academic traditions argue that psychopathy and mental health problems partly reflect personality traits. Research with the middle sample has advanced the study of personality and mental health in two ways. First, Caspi et al. (1992; John, Caspi, Robins, Moffitt, & Stouthamer, 1994) constructed the Big Five personality scales for use with children and adolescents. Second, they provided validational evidence for these scales and demonstrated that variations in these normal personality traits are related to the development of mental health problems.

One of the most fundamental problems in the study of individual differences has been to develop a taxonomy of personality traits. Modern personality research suggests that most personality traits fall within five broad content domains, termed the "Big Five." To illustrate the meaning of the factors, Table IV lists four trait adjectives and four California Adult Q-Sort items that define the positive pole of each dimension (Caspi, 1998). These five factors have been found repeatedly in studies of adults, using different instruments, different data sources, and different languages.

Neuroticism describes the extent to which the person experiences the world as distressing or threatening. Extraversion describes the extent to which the person actively engages with the world or, alternatively, avoids intense social experiences. Conscientiousness describes the extent and strength of impulse control; whether the person is able to delay gratification in the service of more distant goals or is unable to modulate impulsive expressions. Agreeableness describes a person's interpersonal nature on a continuum from warmth and compassion to antagonism. Agreeable persons are empathic, altruistic, helpful, and trusting, whereas antagonistic persons are abrasive, ruthless, manipulative, and cynical. Openness to experience describes the depth, complexity, and quality of a person's mental and experiential life. Although the Big Five personality dimensions have been thoroughly studied in adults, adequate measures of these five dimensions tailored specifically for use with children and adolescents had not been available previously and were developed in the Pittsburgh Youth Study.

Measuring Personality Traits in Childhood and Adolescence

Studying the middle sample, Caspi et al. (1992) developed a language-simplified assessment instrument that could be used by the parents and lay observers to describe the personalities of the boys, the "Common Language" version of the CCQ. From the CCQ data Caspi and colleagues developed scales to measure each dimension in the Five-Factor Model of personality (John et al., 1994; Robins, John, & Caspi, 1994). Table IV lists four CCQ items that define the positive pole of each Big Five dimension.

Personality and Psychopathology

John et al. (1994) examined whether the measures of the Big Five dimensions could discriminate between the boys who showed an externalizing disorder and those who did not. The personality data were obtained from mothers, whereas independent psychopathology data were obtained from teachers. The results showed that three of the Big Five dimensions were involved in the broad externalizing syndrome.

Table IV. Examples of Trait Adjectives, California Adult Q-Sort Items, and California Child Q-Sort Items Defining the Big Five Factors

	Factor definers		
Big five factor	Adjectives[a]	Adult Q-sort items[b]	Child Q-sort items[c]
Extraversion	Active	Skilled in play, humor	Emotionally expressive
	Assertive	Facially, gesturally expressive	A talkative child
	Enthusiastic	Behaves assertively	Makes social contact easily
	Outgoing	Gregarious	Not inhibited or constricted
Agreeableness	Generous	Sympathetic, considerate	Warm and responsive
	Kind	Arouses liking	Helpful and cooperative
	Sympathetic	Warm, compassionate	Develops genuine and close relationships
	Trusting	Basically trustful	Tends to give, lend, and share
Conscientiousness	Organized	Dependable, responsible	Persistent in activities, does not give up easily
	Planful	Able to delay gratification	Attentive and able to concentrate
	Reliable	Not self-indulgent	Planful; thinks ahead
	Responsible	Behaves ethically	Reflective; thinks and deliberates before speaking or acting
Neuroticism	Anxious	Thin-skinned	Fearful and anxious
	Self-pitying	Basically anxious	Tends to go to pieces under stress; becomes rattled and disorganized
	Tense	Concerned with adequacy	Not self-reliant, not confident
	Worrying	Fluctuating moods	Appears to feel unworthy; thinks of self as "bad"
Openness/intellect	Artistic	Wide range of interests	Curious and exploring
	Curious	Introspective	Appears to have high intellectual capacity (whether or not expressed in achievement)
	Imaginative	Values intellectual matters	Creative in perception, thought, work, or play
	Wide interests	Aesthetically reactive	Has an active fantasy life

[a] Adjective checklist items defining the factor in a study of 280 men and women who were rated by 10 psychologists during an assessment weekend at the Institute of Personality Assessment and Research, Berkeley (John, 1990).

[b] Abbreviated California Adult Q-sort items defining the factor in a study of 403 men and women who Q-sorted themselves as part of their participation in the Baltimore Longitudinal Study of Aging (McCrae, Costa, & Busch, 1986).

[c] Abbreviated CCQ items defining the factor in two independent studies: (a) a study of 720 Dutch boys and girls who were Q-sorted by parents and teachers (van Lieshout & Haselager, 1993, 1994) and (b) a study of 350 African American and Caucasian boys aged 12–13 enrolled in the Pittsburgh Youth Study, whose mother was administered the Q-sort (John et al., 1994).

Compared to nonexternalizing boys, externalizing boys were less agreeable, less conscientious, and more extraverted. The results also showed that two of the Big Five dimensions were involved in the broad internalizing syndrome. Compared to noninternalizing boys, internalizing boys were more neurotic and less conscientious. Thus, in contrast to externalizing problems, extraversion and agreeableness were not related to internalizing problems. These findings suggested that the personality traits measured by the Five-Factor Model were differentially implicated in the expression of psychopathology, providing evidence for the discriminating power of the Five-Factor Model in research in childhood mental health.

In related analyses, Robins, John, Caspi, Moffitt, and Stouthamer-Loeber (1996) and Robins, John, and Caspi (1998) used the Q-sort data from the Pittsburgh Youth Study middle sample to study personality types, finding three categorical types of adolescent personality structures: Resilients (Type 1), Overcontrollers (Type 2), and Undercontrollers (Type 3). Resilients were well adjusted and functioning effectively in both interpersonal and task domains. They were by far the most ego-resilient of the three types, suggesting that they were likely to respond adaptively and flexibly to situational demands. Overcontrolled boys were highly introverted and agreeable, and they were more inhibited and more inclined unnecessarily to restrict their needs and impulses. In contrast, Undercontrolled boys were about average in extraversion and very disagreeable, and they were more impulsive and more likely to express their needs and impulses inappropriately. As shown in Fig. 6, these personality types offer clues about mental health problems. Resilient boys were the most likely to be free of psychopathology, Overcontrollers were the most likely to have internalizing problems, and Undercontrollers were the most likely to have externalizing problems. Undercontrollers showed very high levels of comorbidity; they were the most likely of all boys to have symptoms of both externalizing and internalizing syndromes.

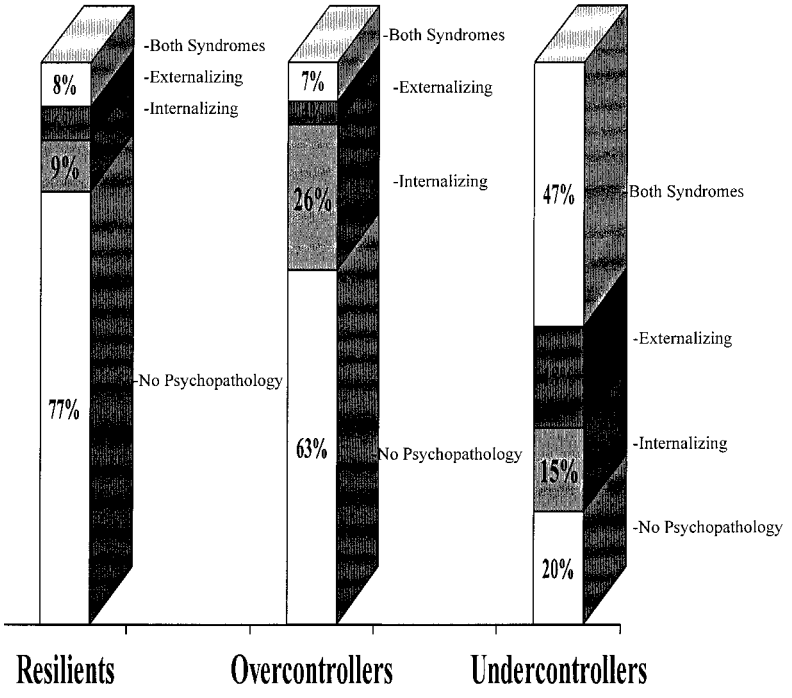

Fig. 6. Association between personality types and mental health problems (Robins et al., 1996).

Subsequent research by independent investigators is replicating these basic findings from the Pittsburgh Youth Study by studying different age groups and different cultures (Caspi, 1998). This widespread replication does not mean that there are only three human personality types. Rather, these results suggest that the three types identified in our research are of sufficient breadth and generalizability to constitute a minimally necessary set of personality types. As such, these three types are good candidates to become an integral part of any generalizable personality typology and offer a good starting point for further research into personality as a risk factor for mental disorders.

Emotions

Emotions figure prominently in psychological maladjustment. Facial expressions are a remarkable indicator of emotions, and these expressions can be measured using a systematic coding system for specific muscle movements of the face, many of which are not under conscious control. Using videotaped data from the middle sample, Keltner, Moffitt, and Stouthamer-Loeber (1995) coded facial expressions of emotion shown by the boys during an interaction with an adult examiner in which the boys experienced failure on part of an IQ test. The emotional expressions of four groups of boys were compared: those with internalizing disorders, those with externalizing disorders, those comorbid with both disorders, and nondisordered boys. The results revealed that increased facial displays of embarrassment were related to the absence of externalizing disorders, suggesting that boys with good mental health felt appropriately chagrined when they encountered a test that was difficult for them. In contrast, externalizing boys showed increased facial expressions of anger, whereas internalizing boys showed increased facial expressions of fear. These findings provide the first evidence for the claim that different adolescent disorders show themselves in distinct, observable expressions of emotions.

SERVICE DELIVERY

Several reports on children's mental health have been published (Costello, Messer, Bird, Cohn, & Reinherz, 1998; U.S. Department of Health and Human Services, 1990, 2001). They highlight the high prevalence of mental health problems as well as the inadequacy of mental health services for

young people (see also Burns et al., 2001; Burns, Hoagwood, & Mrazek, in press). In recent years, access to mental health services through health insurance has not improved (Burns et al., 2001). Reviews of the literature show that many children who would qualify for a diagnosis do not receive help (Burns et al., 2001; Stouthamer-Loeber, Loeber, & Thomas, 1992).

Stouthamer-Loeber, Loeber, and Thomas (1992) found that, based on the caretaker's information at wave A, 15–16% of the boys in the three samples received a *DSM-III-R* diagnosis of any disruptive behavior disorder, including ADHD, ODD, and CD (for details, see Table II). The authors also reported that 14, 21, and 22% of the parents of boys in the youngest, middle, and oldest samples, respectively, had ever sought help from a mental health professional for their boy's problems. However, in a quarter of the cases this help had consisted of only one or two contacts. In all three samples boys with a disruptive behavior disorder were more likely to have had help than did boys without such a disorder. However, only 33, 50, and 56% of the boys with disruptive behavior disorder in the youngest, middle, and oldest samples, respectively, had ever received help from a mental health professional. Only a quarter of the boys identified as the most serious delinquents had ever received help from a mental health professional. These figures point to a seriously underserviced segment of the juvenile population.

Often, antisocial problem behaviors are left to develop undisturbed into delinquency. Eventually delinquents may come before the juvenile court. This may constitute the first attempt to intervene in their antisocial career (Stouthamer-Loeber, Loeber, Van Kammen, & Zhang, 1995). Late intervention, however, often means that more diversified problem behaviors have developed (Loeber & Farrington, 2001). We traced the onset and development of disruptive problem behaviors as related to parental efforts at help-seeking and the boys' contact with the juvenile court in the oldest sample. By eighth grade, when the boys were approximately 14 years old, about 20% of the boys who had committed delinquent acts had been referred to the juvenile court. Only 41% of the delinquent boys' parents had ever sought help from anyone for the boys' problems, and only 27% had sought help from a mental health professional.

On average, by eighth grade, delinquent boys had been showing problem behaviors for about 6 years. For those with a court contact the interval between the onset of problem behavior and the court referral was about 4 years. Both delinquent boys with a court referral and delinquent boys for whom parents had sought help were more seriously disturbed than were boys without a court referral or for whom no help had been sought. Nevertheless, delinquent boys without a court contact or for whom no help had been sought generally had a long history of problem behaviors, leading to the conclusion that the development of disruptive and delinquent behaviors is largely left unchecked until youth show up in juvenile court. A later follow-up showed that by age 18, 48% of the sample had been referred to the juvenile court.

On average, the time interval between early problem behavior and age of first *serious* offense is longer than that between early problem behavior and delinquency in general. For example, data from the Pittsburgh Youth Study (Office of Juvenile Justice and Delinquency Prevention, 1998) show that for the oldest sample the average age of boys first brought before the juvenile court for an index offense was 14.5. Most of these boys had a longstanding history of earlier problem behavior. The average age of onset of minor problem behavior (Step 1 in any of the pathways) for this category of offenders was 7.0. Their average age of onset of moderately serious problem behavior (Step 2 in the pathways) was 9.5, whereas the average age of onset of serious delinquency was 11.9 (Step 3 in the pathways). Thus, about 7 years elapsed between the onset of minor problem behavior and boys' first court appearance for an index offense. This means a wide window of opportunity for intervention during the interim period.

However, the results from the study show that many youngsters who need help for mental health problems do not receive it or do not receive it in a timely manner. There are many barriers to obtaining help that may be of a financial and logistical nature apart from the issue of who is responsible for the recognition of the problems and when intervention should be applied. Although problems may start early in life, it may not be necessary for a child to receive help at the first sign of a problem. Many problems are temporary and disappear; 40% of the nondelinquents in the samples at some time during their lives had displayed disruptive behaviors that disappeared. However, an early onset, a wide variety of problem behaviors and multiple settings in which problem behaviors occur are usually signals that these problems are not transitory.

CONCLUSIONS

The Pittsburgh Youth Study is a longitudinal community study with its participant boys initially enrolled in elementary and middle schools all across the city. One of the main advantages is that it allows the study of early developmental stages of mental health problems (e.g., oppositional behaviors, CP, depressed mood) as they evolve into full-fledged mental disorders in early adulthood. We complemented this investigative strategy by starting a second longitudinal study, the Developmental Trends Study, in 1987 (Loeber et al., 2000), which has as its participants 177 boys referred to clinics between ages 7 and 12 for externalizing and internalizing problems. The boys have been followed up almost yearly through adolescence and early adulthood (the current assessment is at age 24). The Developmental Trends Study allows us to study worsening psychopathology among an already disordered population from childhood to early adulthood. Comparisons between the findings of the Developmental Trends Study and the Pittsburgh Youth Study will be possible because of shared instruments in several areas of measurement.

The preceding findings on juvenile mental health problems in the first 14 years of the Pittsburgh Youth Study constitute a rich mosaic of findings. The study shows that most boys do well and do not suffer from the most common forms of mental health problems during childhood through adolescence.[9] Only a minority (9%) had persistent mental health problems. However, 15–16% of boys in the three samples had a disruptive behavior disorder. If problem behaviors from other domains were included, we found that 20–25% of the boys were multiple problem boys (defined as those with four or more out of eight problem areas).

The prevalence of certain mental health problems varied much by age. First, the prevalence of several mental health problems, including ADHD and depressed mood, decreased with age. The decrease in prevalence of ADHD, as we know from another study, mostly concerns a decrease in overactivity and a fairly stable pattern of inattentive behaviors (Hart, Lahey, Loeber, Applegate, & Frick, 1995). The decrease in the prevalence of boys' depressed mood took place between the ages of 8 and 11, thus presumably prior to the beginning of puberty. This is in contrast to the development of depressed mood in girls, which tends to increase after puberty (Cicchetti & Toth, 1998). We made a case for a more developmentally sensitive diagnostic stratification of disruptive behavior disorders. Parallel analyses testing this stratification with a clinic referred sample of boys in the Developmental Trends Study supported its feasibility (Loeber, Keenan, Lahey, Green, & Thomas, 1993).

Although we found some evidence for clusters of externalizing, as distinct from internalizing mental health problems, boys with multiple problems had predominantly several albeit overlapping externalizing problems, including covert behavior problems, ADHD, CP, and physical aggression. Less central, but not uncommon, were internalizing problems in these boys, such as shy/withdrawn behavior and depressed mood.

Within disruptive behaviors, we found that boys with ADHD were more likely than non-ADHD boys to have co-occurring disruptive disorders. This agrees with other studies, such as our Developmental Trends Study (Loeber et al., 2000). However, the latter study longitudinally tested the association between the disorders, showing that much of the long-term association is based on the presence of earlier disruptive behavior only. This important theme will need to be examined further in the longitudinal data from the Pittsburgh Youth Study.

This study documented the fact that many risk factors known from the literature on antisocial and delinquent behavior also predicted mental health problems (Loeber et al., 1998a). Many of the risk factors, such as risk factors in the child, family processes, and family demographics, replicated findings from other studies and those reported in the Developmental Trends Study (Loeber et al., 2000). Although living in a bad neighborhood was associated with several forms of externalizing problems, it was less strongly associated with a high ADHD score and only related to depressed mood and shy/withdrawn behavior in childhood. This conclusion needs replication, but may point to differential causal processes that are context-dependent for most externalizing problems, and more context-independent for the internalizing problems.

For most mental health problems the higher the number of risk factors, the more likely were mental health problems observed. This applied to ADHD, externalizing problems, and internalizing problems. However, predictions for the two types of internalizing problems measured—depressed mood

[9]We did not measure rare disorders such as psychoses.

and shy/withdrawn behavior—were less strong than those for externalizing problems. This may reflect the fact that the study had been designed from the outset to measure externalizing rather than internalizing problems. It should be noted, however, that associated risk factors may have been corollaries of disorder rather than causes. This certainly would apply to ADHD, which has its origins in early childhood.

Another line of research focused on measuring precursors in childhood to full-fledged psychopathy in adulthood. There is no doubt that some of the symptoms of psychopathy are already present in some youth early in life. However, the predictive utility of the symptoms in forecasting psychopathy remains to be established. This is the main goal of the follow-up of the middle sample at age 22, which is currently underway. We anticipate that the results will be even more meaningful when put in the context of other mental health problems such as the development of substance abuse and dependence, which is often associated with psychopathy. The follow-up of the middle sample will also allow a long-term evaluation of the 11 measures of impulsivity administered at age 13, and their links to psychopathy, other mental health outcomes, and different forms of adjustments in early adulthood.

The initial conceptualization of the Pittsburgh Youth Study had its focus on behavioral development. Therefore, the addition of measurements of personality and emotional problems became an important asset. The follow-up of the middle sample will greatly help to link long-term development and adjustment to both personality traits, emotional behavior, and psychopathy.

Finally, the Pittsburgh Youth Study has shed light on the ratio of mental health problems to the seeking of services for such problems. Increasingly, researchers are focusing on service needs and service delivery (e.g., Burns et al., 2001). So far, our study of these topics has concentrated on the role of parents in seeking help for the problems of their sons. However, later measurements also have included information about the boys' help-seeking for mental health problems. Although we are not in a position to evaluate the effectiveness of interventions received, the Pittsburgh Youth Study can shed light on long-term patterns of mental health needs in the 1,517 boys studied.

In the coming years we will expand our analyses to more fully exploit the rich data base that is part of the Pittsburgh Youth Study. Future topics of investigation will include

(1) the course and probable causes of mental health problems in the youngest sample from age 7 to 20 over 18 data waves, in the middle sample from age 10 to 22 over 8 data waves, and in the oldest sample from age 13 to 25 over 16 data waves;
(2) Because we did diagnostic interviews again at age 15 for the youngest sample and after age 20 for the oldest sample, we will be able to examine continuity and change in psychiatric disorders from childhood to early adulthood;
(3) the relationship between mental health problems and delinquency over time;
(4) the effects of gun carrying by males who have psychiatric disorders on their subsequent violence;
(5) the long-term effects of child abuse on other mental health problems;
(6) the impact of childhood impulsivity on mental health problems;
(7) the prevalence and risk factors for suicide attempts and completed suicides;
(8) the relationship between depressed mood, tanner stages, and long-term adjustment;
(9) the effects of negative life events on depressed mood and shy/withdrawn behaviors; and
(10) the long-term impact of ADHD on disruptive behavior disorders and other psychiatric outcomes.

All these data analysis efforts will also allow the replication of findings across the three samples and further advance an ongoing "dialogue" with other longitudinal studies on the development and risk factors for mental health problems elsewhere in the United States and in other countries.

ACKNOWLEDGMENTS

We thank the staff of the Pittsburgh Youth Study for their dedication in making the study a success over so many years. We are very much indebted to the participants in the study for their patience and cooperation over many data waves. This paper was supported by the National Institute of Mental Health (Grant MH50778), the National Institute of Drug Abuse (Grant DA411018), and the Office of Juvenile Justice and Delinquency Prevention (Grant 96-MU-FX-0012). Points of view or opinions in this document

are those of the authors and do not necessarily represent the official positions of these agencies.

REFERENCES

American Psychiatric Association. (1982). *Diagnostic and statistical manual of mental disorders* (3rd ed.). Washington, DC: Author.

American Psychiatric Association. (1987). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, DC: Author.

American Psychological Association. (1994). *Violence-related policy statements*. Washington, DC: Author.

Angold, A., & Costello, E. J. (1993). Depressive comorbidity in children and adolescents: Empirical theoretical, and methodological issues. *American Journal of Psychiatry*, *150,* 1779–1791.

Angold, A., & Costello, E. J. (1995). A test-retest reliability study of child-reported psychiatric symptoms and diagnoses using the Child and Adolescent Psychiatric Assessment (CAPA-C). *Psychological Medicining*, *25,* 755–762.

Angold, A., Erklani, A., Loeber, R., Costello, E. J., Van Kammen, W., & Stouthamer-Loeber, M. (1996). Disappearing depression in a population sample of boys. *Journal of Emotional and Behavioral Disorders*, *4,* 95–104.

Burns, B. J., Hoagwood, K., & Mrazek, P. J. (1999). Effective treatment for children and adolescents. *Clinical Child and Family Psychology Review*, *2,* 199–254.

Burns, B. J., Landsverk, J., Kelleher, K., Faw, L., Hazen, A., & Keeler, G. (2001). Mental health, education, child welfare, and juvenile justice. In R. Loeber & D. P. Farrington (Eds.), *Child delinquents: Development, intervention and service needs* (pp. 273–303). Thousand Oaks, CA: Sage.

Capaldi, D., & Patterson, G. R. (1987). An approach to the problem of recruitment and retention rates for longitudinal research. *Behavioral Assessment*, *9,* 169–178.

Caron, C., & Rutter, M. (1991). Comorbidity in child psychopathology: Concepts, issues and research strategies. J*ournal of Child Psychology and Psychiatry and Allied Disciplines*, *32,* 1063–1080.

Caspi, A. (1998). Personality development across the life course. In W. Damon (Series Ed.) & N. Heisenberg (Vol. Ed.), *Handbook of child psychology; Vol. 3. Social, personality, and emotional development*. New York: Wiley.

Caspi, A., Block, J., Block, J. H., Klopp, B., Lynam, D., Moffitt, T. E., et al. (1992). A "common language" version of the California child Q-set for personality assessment. *Psychological Assessment*, *4,* 512–523.

Cicchetti, D., & Toth, S. L. (1998). The development of depression in children and adolescents. *American Psychologist*, *53,* 221–241.

Cleckley, H. (1941). *The mask of sanity: An attempt to reinterpret the so-called psychopathic personality*. St. Louis, MO: C.V. Mosby.

Cohen, P., & Brook, J. (1987). Family factors related to the persistence of psychopathology in childhood and adolescence. *Psychiatry*, *50,* 332–340.

Costello, E. J., & Angold, A. (1988). Scales to assess child and adolescent depression: Checklists, screens, and nets. *Journal of the American Academy of Child and Adolescent Psychiatry*, *27,* 726–737.

Costello, A., Edelbrock, C., Kalas, R., Kessler, R., & Klaric, S. H. (1982). *The Diagnostic Interview Schedule for Children, Parent Version (revised)*. Worcester, MA: University of Massachusetts Medical Center.

Costello, E. J., Messer, S. C., Bird, H. R., Cohen, P., & Reinherz, H. Z. (1998). The prevalence of serious emotional disturbance. A re-analysis of community studies. *Journal of Child and Family Studies*, *7,* 411–432.

Elliot, D. S., Huizinga, D., & Menard, S. (1989). *Multiple problem youth: Delinquency, substance use, and mental health problems*. New York: Springer.

Fabrega, H., Ulrick, R., & Loeber, R. (1996). Adolescent psychopathology as a function of informant and risk status. *Journal of Nervous and Mental Disease*, *184,* 27–34.

Farrington, D. P., Gallagher, B., Morley, L., St. Ledger, R., & West, D. J. (1990). Minimizing attrition in longitudinal research: Methods of tracing and securing cooperation in a 24-year follow-up study. In D. Magnusson & L. Bergman (Eds.), *Data quality in longitudinal research* (pp. 122–147). Cambridge: Cambridge University Press.

Farrington, D. P., Loeber, R., & Van Kammen, W. B. (1990). Long-term criminal outcomes of hyperactivity-impulsivity-attention deficit and conduct problems in childhood. In L. N. Robins & M. Rutter (Eds.), *Straight and devious pathways from childhood to adulthood* (pp. 62–81). New York: Cambridge University Press.

Fergusson, D. M., Horwood, L. J., & Lynskey, M. (1994). The childhoods of multiple problem adolescents: A 15-year longitudinal study. *Journal of Child Psychology and Psychiatry and Allied Disciplines*, *35,* 1123–1140.

Frick, P. J., O'Brien, B. S., Wootton, J. M., & McBurnett, K. (1994). Psychopathy and conduct problems in children. *Journal of Abnormal Psychology*, *103,* 700–707.

Hart, E. L., Lahey, B. B., Loeber, R., Applegate, B., & Frick, P. J. (1995). Developmental change in attention-deficit hyperactivity disorder in boys: A four-year longitudinal study. *Journal of Abnormal Child Psychology*, *23,* 729–749.

Huizinga, D., Loeber, R., Thornberry, T. P., & Cothern, L. (2000, November). Co-occurrence of serious and violent juvenile offending and other problem behaviors. *OJJDP Juvenile Justice Bulletin*.

Jackson, K. M., Sher, K. J., & Wood, P. K. (2000). Prospective analysis of comorbidity: Tobacco and alcohol use disorders. *Journal of Abnormal Psychology*, *109,* 679–739.

John, O. P. (1990). The "Big Five" factor taxonomy: Dimensions of personality in the natural language and questionnaires. In L. A. Pervin (Ed.), *Handbook of personality: Theory and research* (pp. 66–100). New York: Guilford.

John, O. P., Caspi, A., Robins, R. W., Moffitt, T. E., & Stouthamer-Loeber, M. (1994). The "little five": Exploring the five-factor model of personality in adolescent boys. *Child Development*, *65,* 160–178.

Kellam, S. G., Ensminger, M. E., & Simon, M. B. (1980). Mental health in first grade and teenage drug, alcohol, and cigarette use. *Drug and Alcohol Dependency*, *5,* 273–304.

Kelley, B. T., Huizinga, D., Thornberry, T. P., & Loeber, R. (1997). Developmental pathways in disruptive and delinquent behavior. *OJJDP Juvenile Justice Bulletin*.

Keltner, D., Moffitt, T. E., & Stouthamer-Loeber, M. (1995). Facial expressions of emotion and psychopathology in adolescent boys. *Journal of Abnormal Psychology*, *104,* 644–652.

Krueger, R. F., Caspi, A., & Moffitt, T. E. (2000). Epidemiological personology: The unifying role of personality in population-based research on problem behaviors. *Journal of Personality*, *67,* 967–998.

Krueger, R. F., Caspi, A., Moffitt, T. E., White, J., & Stouthamer-Loeber, M. (1996). Delay of gratification, personality, and psychopathology: Is low self-control specific to externalizing problems? *Journal of Personality*, *64,* 107–129.

Loeber, R., & Farrington, D. P. (Eds.). (1998). *Serious and violent juvenile offenders: Risk factors and successful interventions*. Thousand Oaks, CA: Sage.

Loeber, R., & Farrington, D. P. (Eds.). (2001). *Child delinquents: Development, intervention and service needs*. Thousand Oaks, CA: Sage.

Loeber, R., Farrington, D. P., Stouthamer-Loeber, M., Moffitt, T. E., & Caspi, A. (1998). The development of male offending: Key findings from the first decade of the Pittsburgh youth study. *Studies in Crime and Crime Prevention*, *7,* 141–171.

Loeber, R., Farrington, D. P., Stouthamer-Loeber, M., Moffitt, T. E., Caspi, A., White, H. R., et al. (in press). The Development of male offending: Key findings from 14 years of the Pittsburgh Youth Study. In T. Thornberry & M. Krohn (Eds.), *Longitudinal research in the social and behavioral sciences*. New York: Kluwer/Plenum.

Loeber, R., Farrington, D. P., Stouthamer-Loeber, M., & Van Kammen, W. B. (1998a). *Antisocial behavior and mental health problems: Explanatory factors in childhood and adolescence*. Mahwah, NJ: Erlbaum.

Loeber, R., Farrington, D. P., Stouthamer-Loeber, M., & Van Kammen, W. B. (1998b). Multiple risk factors for multiproblem boys: Co-occurrence of delinquency, substance use, attention deficit, conduct problems, physical aggression, covert behavior, depressed mood, and shy/withdrawn behavior. In R. Jessor (Ed.), *New perspectives on adolescent risk behavior* (pp. 90–149). New York: Cambridge University Press.

Loeber, R., Green, S. M., Lahey, B. B., Frick, P. J., & McBurnett, K. (2000). Findings on disruptive behavior disorders from the first decade of the developmental trends studies. *Clinical Child and Family Psychology Review*, *3,* 37–60.

Loeber, R., & Hay, D. F. (1997). Key issues in the development of aggressive and violence from childhood to early adulthood. *Annual Review of Psychology*, *48,* 371–410.

Loeber, R., & Keenan, K. (1994). The interaction between conduct disorder and its comorbid conditions: Effects of age and gender. *Clinical Psychology Review*, *14,* 497–523.

Loeber, R., Keenan, K., Lahey, B. B., Green, S. M., & Thomas, C. (1993). Evidence for developmentally based diagnoses of oppositional defiant disorder and conduct disorder. *Journal of Abnormal Child Psychology*, *21,* 377–410.

Loeber, R., Russo, M. F., Stouthamer-Loeber, M., & Lahey, B. B. (1994). Internalizing problems and their relation to the development of disruptive behaviors in adolescence. *Journal of Research on Adolescence*, *4,* 615–637.

Loeber, R., & Stouthamer-Loeber (1998). The development of juvenile aggression and violence: Some common misconceptions and controversies. *American Psychologist*, *53,* 242–259.

Loeber, R., Stouthamer-Loeber, M., Van Kammen, W. B., & Farrington, D. P. (1991). Initiation, escalation, and desistance in juvenile offending and their correlates. *Journal of Criminal Law and Criminology*, *82,* 36–82.

Loeber, R., Wei, E., Stouthamer-Loeber, M., Huizinga, D., & Thornberry, T. (1999). Behavioral antecedents to serious and violent juvenile offending: Joint analyses from the Denver youth survey, Pittsburgh youth study, and the Rochester development study. *Studies in Crime and Crime Prevention*, *8,* 245–263.

Loeber, R., Wung, P., Keenan, K., Giroux, B., Stouthamer-Loeber, M., Van Kammen, W. B., et al. (1993). Developmental pathways in disruptive child behavior. *Development and Psychopathology*, *5,* 101–132.

Lynam, D. R. (1996). The early identification of chronic offenders: Who is the fledgling psychopath? *Psychological Bulletin*, *120,* 209–234.

Lynam, D. R. (1997). Pursuing the psychopath: Capturing the fledgling psychopath in a nomological net. *Journal of Abnormal Psychology*, *106,* 425–438.

Lynam, D. R. (1998). Early identification of the fledgling psychopath: Locating the psychopathic child in the current nomenclature. *Journal of Abnormal Psychology*, *120,* 209–234.

Maguin, E., & Loeber, R. (1996). Academic performance and delinquency. In M. Tonry (Ed.), *Crime and justice* (Vol. 20, pp. 145–264). Chicago: University of Chicago Press.

Maguin, E., Loeber, R., & LeMahieu, P. (1993). Does the relationship between poor reading and delinquency hold for different age and ethnic groups? *Journal of Emotional and Behavioral Disorders*, *1,* 88–100.

McCrea, R. R., Costa, P. T., & Busch, C. M. (1986). Evaluating comprehensiveness in personality systems: The California Q-Set and the five-factor model. *Journal of Personality*, *54,* 430–446.

Messer, S. C., Angold, A., Loeber, R., Costello, E. J., Van Kammen, W. B., & Stouthamer-Loeber, M. (1995). The development of a short questionnaire for use in epidemiological studies of depression in children and adolescents: Factor composition and structure across development. *International Journal of Methods in Psychiatric Research*, *5,* 251–262.

Miringoff, M., & Miringoff, M.-L. (1999). *The social health of the nation. How America is really doing*. New York: Oxford University Press.

Office of Juvenile Justice and Delinquency Prevention (OJJDP). (1998). Serious and violence juvenile offenders. *Juvenile Justice Bulletin*.

Robins, L. N. (1966). *Deviant children grown up* (5th ed.). Baltimore: Williams & Wilkins.

Robins, R. W., John, O. P., & Caspi, A. (1994). Major dimensions of personality in early adolescence: The Big Five and beyond. In C. F. Halverson, G. A. Kohnstamm, & R. P. Martin (Eds.), *The developing structure of temperament and personality from infancy to adulthood* (pp. 267–291). Hillsdale, NJ: Erlbaum.

Robins, R. W., John, O. P., & Caspi, A. (1998). The typological approach to studying personality. In R. B. Cairns, J. Kagan, & L. Bergman (Eds.), *The individual in developmental research* (pp. 135–160). Thousand Oaks, CA: Sage.

Robins, R. W., John, O. P., Caspi, A., Moffitt, T. E., & Stouthamer-Loeber, M. (1996). Resilient, overcontrolled, and undercontrolled boys: Three replicable personality types. *Journal of Personality and Social Psychology*, *70,* 157–171.

Russo, M., Loeber, R., Lahey, B. B., & Keenan, K. (1994). Oppositional defiant and conduct disorders: Validation of the DSM-III-R and an alternative option. *Journal of Clinical Child Psychology*, *23,* 56–68.

Shapiro, D. (1965). *Neurotic styles*. New York: Basic Books.

Stouthamer-Loeber, M. (1993). Optimizing data quality of individual and community sources in longitudinal research. In D. P. Farrington, R. J. Sampson, & P. O. Wikström (Eds.), *Integrating individual and ecological aspects of crime* (pp. 259–277). Stockholm: National Council for Crime Prevention.

Stouthamer-Loeber, M., Loeber, R., & Thomas, C. (1992). Caretakers seeking help for boys with disruptive delinquent behavior. *Comprehensive Mental Health Care*, *2,* 159–178.

Stouthamer-Loeber, M., Loeber, R., Van Kammen, W. B., & Zhang, Q. (1995). Uninterrupted delinquent careers: The timing of parental helpseeking and juvenile court contact. *Studies on Crime and Crime Prevention*, *4,* 236–251.

Stouthamer-Loeber, M., & Van Kammen, W. B. (1995). *Data collection and management: A practical guide*. Newbury Park, CA: Sage.

Stouthamer-Loeber, M., Van Kammen, W. B., & Loeber, R. (1992). The nuts and bolts of implementing large-scale longitudinal studies. *Violence and Victims*, *7,* 63–78.

Tremblay, R. E., Pihl, R. O., Vitaro, F., & Doblin, P. L. (1994). Predicting early onset of male antisocial behavior from preschool behavior. *Archives of General Psychiatry*, *51,* 732–739.

U.S. Congress, Office of Technology Assessment. (1986). Children's mental health: Problems and services, background paper, OTA-BP-H-33. Washington, DC: U.S. Government Printing Office.

U. S. Department of Health and Human Services. (1990). *National plan for research on child and adolescent mental disorders*. Washington, DC: U.S. Government Printing Office.

U.S. Department of Health and Human Services. (2001). *Report of the surgeon general's conference on children's mental health: A national action agenda*. Washington, DC: Virtual Office of the Surgeon General.

Van Kammen, W. B., & Stouthamer-Loeber, M. (1997). Practical aspects of interview data collection and data management. In L. Bickman & D. Rog (Eds.), *Handbook of applied social research methods* (pp. 375–398). Thousand Oaks, CA: Sage.

van Lieshout, C. F. M., & Haselager, G. J. T. (1993). *The Big Five Personality factors in the Nijmegen California Child Q-set (NCCQ)*. Nijmegen, The Netherlands: University of Nijmegen.

van Lieshout, C. F. M., & Haselager, G. J. T. (1994). The Big Five personality factors in Q-short descriptions of children and adolescents. In C. F. Halverson, G. A. Kohnstamm & R. P. Martin (Eds.), *The developing structure of temperament and personality from infancy to adulthood* (pp. 293–318). Hillsdale, NJ: Erlbaum.

Wei, E. H. (2001). Unpublished analyses on selective attrition. Western Psychiatric Institute and Clinic, School of Medicine, University of Pittsburgh, Pittsburgh, PA.

White, J. L., Moffitt, T. E., Caspi, A., Bartusch, D. J., Needles, D. J., & Stouthamer-Loeber, M. (1994). Measuring impulsivity and examining its relationship to delinquency. *Journal of Abnormal Psychology*, *103,* 192–205.